

OCO-2 Data Quality Statement: Level 2 Data Release 8 (B8) – September 22, 2017
Greg Osterman, Annmarie Eldering, Michael Gunson
Jet Propulsion Laboratory, California Institute of Technology, Pasadena CA

The Orbiting Carbon Observatory (OCO-2) has released the latest version of the Level 2 (L2) data product, containing estimates of the column-averaged dry air mole fraction (X_{CO_2}), other geophysical quantities retrieved from OCO-2 observations. This version of the L2 Product is Build 8.0 (B8) and has been processed with an updated version of the OCO-2 Level 1 and Level 2 algorithms. The latest version of the algorithm includes updated radiometric calibration for the L1b product, updated spectroscopic parameters, the addition of stratospheric aerosols, and a more realistic treatment of surface reflectance in the L2 algorithm. Similar to data release 7 (B7), the full data products are available at the Goddard Earth Sciences Data and Information Services Center (GES DISC, <https://disc.gsfc.nasa.gov/uui/datasets?keywords=oco2>).

The OCO-2 X_{CO_2} values are tied to the World Meteorological Organization's CO_2 standard by comparison with ground-based observations from the Total Carbon Column Observation Network (TCCON). The OCO-2 measurements in nadir and glint modes are compared to TCCON to evaluate potential biases in the satellite retrievals of X_{CO_2} (see Wunch et al., 2017 and Wunch et al., 2011). In addition to the comparisons to TCCON, the OCO-2 B8 data has been compared to other estimates of X_{CO_2} including global models and the previous version of OCO-2 data. Several different analyses have allowed for an estimate of the bias and scatter of the data. The figure below shows comparison of X_{CO_2} from OCO-2 target mode observations after bias correction compared to TCCON (slope of 1.00001 ± 0.00143 , r^2 of 0.923). The comparisons for glint and nadir mode data to TCCON tend to show slightly lower correlations.

OCO-2 L2 data are also available in "Lite" data product files. These Lite data products are grouped into daily files and provides both uncorrected and bias corrected X_{CO_2} values, together with a reduced number of ancillary data fields. The B8A Lite files will be available at the site co2.jpl.nasa.gov and the GES DISC starting in October 2017. There will be an updated version (B) when the ocean nadir data and high latitude data have been assessed and a bias correction for them has been developed. Detailed information on data screening, warn levels and bias correction is provided in the "Warn Level, Bias Correction and Lite File Product Description" document available at both the GES DISC (<https://disc.gsfc.nasa.gov/information/documents/5967c79a021004072e521ee8/oco-2-documents?keywords=oco-2>) and co2.jpl.nasa.gov sites.

There is more documentation to help with the OCO-2 data products available at the GES DISC OCO-2 documentation page (see link above). Specifically, the Data User's Guide (DUG) provides an overview of the mission and information on how to use the key data fields in the standard products. It addresses both the Level 1B (L1b) and L2 data and includes a description of the content of the product files as well as the software interface specification (SIS) documents. The physics of the measurements and the retrieval technique are described in the L2 Algorithm Theoretical Basis Document

(ATBD). Similarly, there is an updated ATBD for the L1b data. Some of these documents are in process of being updated after the release of the B8 data, but the majority of the content remains valid and relevant.

D. Wunch et al., A method for evaluating bias in global measurements of CO₂ to-tal columns from space, *Atmos. Chem. Phys.*, 11, 12317–12337, 2011
<https://doi.org/10.5194/acp-11-12317-2011>.

D. Wunch et al., Comparisons of the Orbiting Carbon Observatory-2 (OCO-2) XCO₂ measurements with TCCON, *Atmos. Meas. Tech.*, 10, 2209–2238, 2017
<https://doi.org/10.5194/amt-10-2209-2017>

